ABBREVIATIONS

AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AL	ACOUSTICAL LINING
BO	BLANK OFF
BR	BOTTOM REGISTER
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
DN	DOWN
FC	FLEXIBLE CONNECTION
FG	FLOOR GRILLE
FT	FEET
GPM	GALLONS PER MINUTE
MBH	THOUSAND BTU PER HOUR
NIC	NOT IN THIS CONTRACT
NTS	NOT TO SCALE
OA	OUTSIDE AIR INTAKE
UH	UNIT HEATER
RPM	REVOLUTION PER MINUTE
SA	SOUND ATTENUATOR
SM	SHEET METAL
WMS	WIRE MESH SCREEN

PIPING SYMBOLS

	EXISTING PIPE TO REMAIN
	EXISTING PIPE TO BE REMOVED
	ANCHOR
FOG	FUEL OIL GAUGE LINE
FOR	FUEL OIL RETURN
FOF	FUEL OIL FILL
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT LINE
LPR	LOW PRESSURE CONDENSATE RETURN
LPS	LOW PRESSURE STEAM
FFS	FUEL FILTRATION SUPPLY
FFR	FUEL FILTRATION RETURN
	FLOAT AND THERMOSTATIC STEAM TRAP
	ARROW INDICATES DIRECTION OF FLOW
	PIPE GUIDE
	UNION
	PIPE UP
	PIPE DOWN
	1" AS LEG
	"Y" TYPE STRAINER WITH BLOW OFF VALVE
	PITCH PIPE IN DIRECTION OF ARROW
	LOW PRESSURE DRIP TRAP ASSEMBLY

VALVES AND GAUGES

	GLOBE VALVE
	GATE VALVE
	CHECK VALVE
	AUTOMATIC TWO WAY CONTROL VALVE
	ELECTRIC CONTROL VALVE
	RELIEF VALVE
	PRESSURE OR VACUUM GAUGE WITH COCK
	DUPLEX STRAINER
	THERMOSTAT, PNEUMATIC
	LOW PRESSURE TRAP RIG
	BALL VALVES
	COMBINATION FLOAT AND THERMOSTATIC TRAP
	BRICK VENT
	FUSIBLE LINK FIRE SHUTOFF VALVE

SHEETMEAL SYMBOLS

	SUPPLY DUCT UNDER POSITIVE PRESSURE
	SUPPLY DUCT NEGETIVE POSITIVE PRESSURE
AD	ACCESS DOOR IN DUCT
SDH	SMOKE DETECTOR HEAD IN DUCT
18x12 / 18x12	DUCT SIZE (FIRST SIZE INDICATES PLAN SIZE)
	DUCT FLEXIBLE CONNECTION
	MOTORIZED DAMPER
	ACOUSTIC LINING DUCTWORK
	SQUARE FEET

MECHANICAL

A. GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM ALL WORK NECESSARY TO FURNISH, OFFLOAD, STORE, STAGE, REMOVE AND INSTALL EQUIPMENT APPURTENANCES, MATERIALS AND SERVICES TO MAKE INSTALLATION COMPLETE, FUNCTIONAL AND OPERABLE TO THE SATISFACTION OF THE ENGINEER.
2. AS PART OF THIS CONTRACT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF CERTAIN EQUIPMENT, APPURTENANCES AND MATERIALS WHICH WILL BE FURNISHED BY THE PORT AUTHORITY (PA), AS DELINEATED ON THESE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT, VALVES, ACTUATORS, CONTROL WIRING, CONTROL DEVICES, RACKS, SUPPORTS, VIBRATION ISOLATORS, ETC. AS PER THE MANUFACTURERTS/ VENDORTS RECOMMENDATIONS.
3. THE CONTRACTOR SHALL INCORPORATE ALL PERTINENT INFORMATION OF THE PA FURNISHED EQUIPMENT IN HIS SHOP DRAWINGS AND SUBMIT TO THE ENGINEER FOR APPROVAL. SUCH INFORMATION SHALL INCLUDE BUT NOT LIMITED TO THE DIMENSIONS, LOCATIONS, CONNECTION DETAILS, INSTALLATION DETAILS, FUNCTIONS, CONTROLS, ELECTRICAL WIRING AND POWER REQUIREMENTS FOR EACH PIECE OF EQUIPMENT WIRING TERMINATIONS.
4. THE CONTRACTOR SHALL COORDINATE WITH THE VENDORS OF THE PA FURNISHED EQUIPMENT FOR THE PURPOSE OF DELIVERY, RIGGING AND PROPER HANDLING AND INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE THE NECESSARY TECHNICAL SUPPORT FROM THE APPLICABLE MANUFACTURER(S) TO ENSURE PROPER INSTALLATION, TO SATISFY THE OPERATIONAL AND FUNCTIONAL REQUIREMENTS OF ALL EQUIPMENT AND COMPONENTS INSTALLED BY HIM UNDER THIS CONTRACT.
5. THE CONTRACTOR SHALL INSPECT, AND IF ACCEPTABLE, APPROVE ALL EQUIPMENT AND MATERIALS PROVIDED BY THE PA PRIOR TO HANDLING, STORING AND INSTALLING.
6. REFER TO THE CONTRACT SPECIFICATIONS FOR THE LIST OF REFERENCE DOCUMENTS PERTAINING TO THE SPECIFICATIONS OF THE EQUIPMENT, APPURTENANCES AND MATERIALS FURNISHED BY THE PA.
7. THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITIES FOR THE LOSS OR DAMAGE OF ANY OF THE PA FURNISHED EQUIPMENT DUE TO HIS NEGLIGENCE. THE CONTRACTOR SHALL REPAIR OR REPLACE SUCH EQUIPMENT TO THE SATISFACTION OF THE ENGINEER, PLUS LIQUIDATED DAMAGES FOR ANY DELAY TO THE CONTRACT SCHEDULE RESULTED FROM THE LOSS OF DAMAGE.
8. THE CONTRACTOR SHALL SUBMIT DETAILED CONSTRUCTION PHASING PLAN PRIOR TO STARTING THE WORK TO BE PERFORMED UNDER THIS CONTRACT, INCLUDING THE METHODOLOGY FOR THE RIGGING OF MATERIAL AND EQUIPMENT. SUCH PLAN SHALL DETAIL ALL TEMPORARY STRUCTURES AND EQUIPMENT NECESSARY FOR THE PROPER HANDLING OF THE MATERIAL AND EQUIPMENT WITH THE RISK OF DAMAGING ANY STRUCTURE, EQUIPMENT OR PERSONNEL.
9. THE CONTRACTOR SHALL PROVIDE ALL PIPE HANGERS AND EQUIPMENT SUPPORTS TO COMPLY WITH SEISMIC RESTRAINTS REQUIRED BY LOCAL LAW 17/95.
10. ALL MECHANICAL AND ELECTRICAL WORK SHALL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE AND SHALL MEET ALL LOCAL CODES AS STATED BELOW. ALL DEFECTS, WHICH SHALL BE THE DATE OF FINAL PAYMENT OR THE DATE OF FORMAL NOTICE OF ACCEPTANCE, WHICHEVER IS EARLIER.

B. NOTICE TO BIDDERS

1. THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO SERVE JOINTLY AS A BASIS UPON WHICH THE CONTRACTOR SHALL SUBMIT A CONTRACT PRICE FOR THE MATERIAL AND LABOR PROVISIONS.
2. WHEN CONFLICTS OCCUR IN THE SPECIFICATIONS OR ON THE DRAWINGS, OR BETWEEN EITHER, THE ITEMS GREATER QUANTITY OR HIGHER COST SHALL BE PROVIDED.
3. THE CONTRACTOR SHALL PROVIDE ALL ITEMS OF LABOR OR MATERIALS SPECIFICALLY INDICATED, OR REQUIRED TO COMPLETE THE INTENDED INSTALLATIONS.
4. THE CONTRACTOR SHALL COORDINATE HIS WORK IN ORDER THAT CONFLICTS IN SPACE LOCATIONS DO NOT OCCUR.
5. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THIS WORK WITH ITS COMPLETION AND FINAL ACCEPTANCE, AND SHALL REPLACE ANY DAMAGED, LOST OR STOLEN ITEMS WITH IDENTICAL REPLACEMENTS, WITHOUT ADDITIONAL COST TO THE OWNER.
6. ALL WORK IN OCCUPIED TENANT AREAS SHALL BE PERFORMED ON OTHER THAN NORMAL WORKING HOURS OR SCHEDULED AS DIRECTED BY THE OWNER.
7. THE CONTRACTOR SHALL NOTIFY THE OWNER WHEN SHUTDOWN OF EXISTING SYSTEMS BECOMES NECESSARY. SHUTDOWN TIME SHALL BE KEPT TO A MINIMUM.
8. THE CONTRACTOR WILL BE HELD TO HAVE VISITED THE SITE AND EXAMINED THE DRAWINGS AND SPECIFICATIONS OF OTHER TRADES AND OF GENERAL CONSTRUCTION TRADES TO SATISFY HIMSELF OF ALL CONDITIONS INVOLVED. THE CONTRACTOR SHALL VERIFY ALL MEASUREMENTS GIVEN ON THE DRAWINGS AND THOROUGHLY ACQUAINT HIMSELF WITH ALL EXISTING CONDITIONS AFFECTING THE PROPER INSTALLATION OF HIS WORK.
9. THE WORK UNDER THIS CONTRACT SHALL BE PERFORMED AND COORDINATED SIMULTANEOUSLY WITH WORK OF OTHER TRADES SO AS NOT TO DELAY THE OVERALL PROGRESS OR WORK.

C. SHOP DRAWING & EQUIPMENT SUBMISSIONS

1. ONE SET OF SEPIAS FOR DUCTWORK, PIPING LAYOUT AND CERTIFIED EQUIPMENT MANUFACTURER'S DATA SHALL BE SUBMITTED FOR APPROVAL TO THE ENGINEER PRIOR TO ERECTION OR PURCHASE. SUBMIT THREE SETS OF CATALOG CUTS FOR FANS, AIR CONDITIONING UNITS, PIPEHANGERS, INSULATION, DIFFUSERS, PUMPS, MISC. ACCESSORIES, ETC.,
2. COORDINATE WITH THE WORK OF OTHER TRADES.
3. AIR BALANCING AND TESTING. SUBMIT REPORT AS SPECIFIED.
4. SHOP DRAWINGS SHALL BE 3/8"=1'-0" SCALE.
5. SUBMIT AIR HANDLER UNIT HANGING DETAILS.

D RECORD DRAWINGS

1. A REPRODUCIBLE RECORD DRAWING SHALL BE SUPPLIED UPON WHICH CORRECTIONS HAVE BEEN MADE TO PROVIDE AN ACCURATE AND COMPLETE RECORD OF THE WORK AS INSTALLED. A REPRODUCIBLE COPY OF THIS DRAWING SHALL BE PROVIDED TO THE OWNER ONCE THE INSTALLATION IS COMPLETE.

E. CODES, PERMITS AND INSPECTION

1. ALL WORK SHALL MEET OR EXCEED THE LATEST REQUIREMENT OF THE NEW YORK CITY BUILDING CODE, NATIONAL ELECTRICAL CODE, THE NFPA AND OTHER AUTHORITIES EXERCISING JURISDICTION OF THE WORK OF THIS PROJECT.
2. COMPLY WITH APPLICABLE UTILITY COMPANY RULES AND REGULATIONS.
3. COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) REQUIREMENTS.
4. SECURE AND PAY FOR ALL REQUIRED PERMITS AND INSPECTION CERTIFICATES AND TRANSMIT SAME TO THE OWNER AT THE COMPLETION OF THE WORK.

F. GUARANTEES

1. ALL WORK SHALL BE GUARANTEED TO BE FREE FROM LEAKS OR OTHER DEFECTS. ALL DEFECTIVE MATERIAL OR WORKMANSHIP AS WELL AS DAMAGES TO THE WORK SHALL BE REPLACED AND REPAIRED. ALL TRADES RESULTING FROM SAME SHALL BE REPLACED OR REPAIRED FOR THE DURATION OF THE GUARANTEE PERIOD.
2. THE GUARANTEE PERIOD SHALL BE FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE, WHICH SHALL BE THE DATE OF FINAL PAYMENT OR THE DATE OF FORMAL NOTICE OF ACCEPTANCE, WHICHEVER IS EARLIER.
3. CERTIFICATION SHALL BE FOR ONE (1) YEAR FROM THE DATE OF ACCEPTANCE, WHICH SHALL BE THE DATE OF FINAL PAYMENT OR THE DATE OF FORMAL NOTICE OR ACCEPTANCE, WHICHEVER IS EARLIER.

G. REMOVALS AND ALTERATIONS

1. THE CONTRACTOR SHALL REMOVE, RELOCATE, REPLACE, ADJUST, ADAPT AND MODIFY EXISTING EQUIPMENT AND/OR SYSTEMS AS REQUIRED BY THE DRAWINGS OR SPECIFICATION, AND AS MAY BE REQUIRED WHEN THE COMPLETION OF WORK IN THE CONTRACT OR OTHER CONTRACT WORK.
2. ALL REMOVED EQUIPMENT AND MATERIAL SHALL BE REMOVED FROM THE PROJECT SITE.

H. WORK INCLUDE UNDER OTHER SECTIONS OF WORK

1. ITEMS OF WORK WHICH SHALL BE INCLUDED UNDER OTHER SECTIONS OF WORK ARE AS FOLLOWS:
   - A) ELECTRICAL WIRING FOR POWER.
   - B) PROVISION OF ELECTRICAL DISCONNECT SWITCHES OR FUSES (UNLESS FURNISHED INTEGRALLY WITH EQUIPMENT).

I. FUEL HANDLING SYSTEMS

1. DESCRIPTION
   - A) PROVIDE FUEL OIL HANDLING SYSTEMS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. WORK INCLUDED
   - A) FIELD FABRICATED FUEL OIL RECTANGULAR STORAGE TANKS.
   - B) FUEL OIL MANAGEMENT SYSTEM AND LEVEL CONTROL CENTER
   - C) MAIN TANK GAUGE AND LEAK MONITORING SYSTEM
   - D) FUEL OIL PUMPING AND STRAINING SET
   - E) FILTRATION, DEWATERING AND FUEL STABILIZATION SYSTEM
   - F) 18" HEADER SYSTEM
   - G) FUEL OIL SPECIALITES
   - H) PIPING, VALVES AND ACCESSORIES, SPECIFICATION SECTION 15503.
   - I) UNDERGROUND PIPING SPECIFICATION SECTION 15503.
3. SUBMITTALS
   - A) SUBMIT FULL TECHNICAL RATING DATA, CATALOG CUTS, MODEL NUMBERS, DIMENSIONAL INSTALLATION DETAILS, CAPACITIES, CONSTRUCTION DETAILS, PIPING DETAILS, WIRING DIAGRAMS AND INSTALLATION INSTRUCTIONS.
   - B) SUBMIT SHOP DRAWINGS OF THE FIELD FABRICATED TANK FOR APPROVAL. THE SHOP DRAWINGS SHALL INDICATE THE SIZE, CONSTRUCTION DATA, REINFORCEMENT DETAILS, LADDER INSTALLATION, ALL DETAILS OF ANGLE IRON BRACKETS, AND RIVETING. LOCATE ALL WELD JOINTS, TAPPING CONNECTION AND LOCATION OF THE TAPPINGS.
   - C) SYSTEM VENDOR SHALL COORDINATE PRODUCT DATA PRESENTED BY LEAK MONITORING SYSTEM AND FUEL MANAGEMENT SYSTEM AND FIELD FABRICATED TASKS TO PROVIDE A COMPREHENSIVE SET OF INTERFACED DRAWINGS WHICH WILL SERVE AS THE BASIS FOR SYSTEM EVALUATION BY THE ENGINEER AND INSTALLATION BY MECHANICAL CONTRACTOR DESIGNATED BY THE OWNER.

J. PRODUCTS

1. FIELD FABRICATED FUEL OIL RECTANGULAR STORAGE TANKS
   - A) PROVIDE FUEL OIL STORAGE TANKS OF SIZE AND CAPACITY AS INDICATED ON THE PLANS. TANKS SHALL BE OF RECTANGULAR CONSTRUCTION AND SHALL BE PROVIDED WITH A 24" DIAMETER MANHOLE IN THE TOP. TANK SHALL BE PROVIDED WITH PIPE TAPPINGS FOR FILL, RELIEF, VENT, RETURN, SUPPLY TO TRANSFER PUMPS, GARAGE, OVERFILL ALARM, AND TWO (2) 2" SPARES. TANKS SHALL BE CONSTRUCTED OF 5/16" THICK WELDED PLATE STEEL. CORNERS MAY BE MADE UP BY BENDING THE PLATES OR BY USING ANGLES. MINIMUM RIVET DIAMETER IN SEAMS SHALL BE 5/8" AND RIVETS SHALL BE SPACED NOT MORE THAN 2-1/4" CENTER TO CENTER. ALL FLAT SURFACES OF RECTANGULAR TANKS SHALL BE BRACED BY STRUCTURAL MEMBERS OR RODS. WHEN STRUCTURAL MEMBERS ARE USED, THE RIVET PITCH SHALL NOT EXCEED SIX INCHES.
   - B) PAINT EXTERIOR OF TANKS WITH 1 COAT OF BITUMASTIC.
   - C) PROVIDE STEEL LADDERS INSIDE AND OUT FOR EACH RECTANGULAR TANK.
   - D) MANHOLE COVER TO BE PROVIDED WITH BRASS BOLTS AND METALLIC GASKETS.
   - E) ALL OPENINGS SHALL BE THROUGH THE TOP OF THE TANKS.
   - F) PROVIDE ANGLE BRACKETS WELDED TO SIDES OF THE TANK TO ANCHOR THE TANKS TO THE CURB. PROVIDE AND COORDINATE THE ANCHOR DETAILS WITH THE CONCRETE SUBCONTRACTOR.
   - G) RECTANGULAR TANKS TO BE BUILT IN COMPLIANCE WITH NEW YORK CITY BUILDING CODE REGULATIONS.
   - H) HYDROSTAT TANKS TO 25 PSI FOR A ONE-HOUR DURATION AND WITNESSED BY THE ENGINEER AND P.A. REPRESENTATIVE.
   - I) SUBMIT SHOP DRAWINGS OF THE TANK FOR APPROVAL. THE SHOP DRAWINGS SHALL INDICATE THE SIZE, CONSTRUCTION DATA, TAPPING CONNECTIONS AND LOCATION OF THE TAPPINGS.
   - J) PROVIDE FABRICATOR'S WARRANTY FOR ONE (1) YEAR FROM DATE OF OWNER'S ACCEPTANCE OF FUEL OIL SYSTEM, AGAINST FAULTY MATERIAL OR WORKMANSHIP.
2. FUEL OIL SPECIALITES
   - A) FILL LINE: STORAGE TANK FILL LINE SHALL TERMINATE IN A GALVANIZED, CAST IRON FILL BOX WITH THREADED BRASS CAP AND OIL TREATED GASKET TO MAKE IT WATERTIGHT. BOX SHALL BE FULL SIZE OF THE PIPE. FILL BOX SHALL BE PROTECTED AT GRADE WITH A WATERTIGHT STREET BOX. FILL BOX AND STREET BOX SHALL BE EQUAL TO PREFERRED UTILITIES MFG. CORP. TYPE "W" AND TYPE 1286 RESPECTIVELY.
   - B) VENT LINE: THE VENT LINE SHALL TERMINATE AND BE MOUNTED FLUSH IN THE OUTSIDE WALL WHERE SHOWN ON THE PLANS. UPON A 3' CAST ALUMINUM VENT BRICK EQUAL TO PREFERRED UTILITIES.
   - C) FOOT VALVE: PROVIDE ON TANK SUCTION STUB A 2" BRONZE, SINGLE POPPET FOOT VALVE WITH LAPPED-IN SEAT, AND 20 MESH MONEL SCREEN. FOOT VALVE SHALL BE EQUAL TO PREFERRED UTILITIES TYPE 900. TYPICAL FOR EACH TANK.
   - D) THE FILL AND VENT LINES SHALL BE SUITABLY IDENTIFIED BY ONE-PIECE BRONZE NAME PLATES, APPROXIMATELY 3" X 6" WITH POLISHED RAISED LETTERS AND EQUAL TO PREFERRED UTILITIES MODEL PVNP.
   - E) PROVIDE LEAK DETECTION SWITCHES EQUAL TO PREFERRED UTILITIES MODEL RBS-WH FOR THE FOLLOWING POINTS: ONE UNIT IN EACH BOTTOM OF VERTICAL MASONRY FUEL OIL RISER SHAFT AND IN THE BASINS OF THE PUMP SET AND FUEL FILTRATION SET.
   - F) PROVIDE LEAK DETECTION SWITCHES EQUAL TO PREFERRED UTILITIES MODEL HO-A1 LEAK DETECTION SENSOR WITH LEAK DETECTOR TEST MODULE TO MONITOR FLUID BUILDUP IN THE SUMP PIT IN THE TANK ROOM, IN THE TWO SUMP PANS IN THE TANK ROOM AND ON ALL FOUR SIDES OF EACH TANK. EACH MODULE CONNECTS TO THREE (3) LEAK SENSORS
   - G) PROVIDE LOW LEVEL SWITCH EQUAL TO MCDONALD & MILLER MODEL 80 TO MONITOR LOW LEVEL IN THE GENERATOR FUEL OIL HEADER PIPE.
   - H) PROVIDE HIGH LEVEL SWITCH EQUAL TO MERCOID MODEL DAH-521-3 TO MONITOR THE HIGH LEVEL OF FUEL IN THE GENERATOR FUEL OIL HEADER PIPE.
   - I) PROVIDE HIGH LEVEL SWITCH EQUAL TO PREFERRED UTILITIES MODEL PLS-1 TO MONITOR HIGH LEVEL IN EACH MAIN FUEL OIL STORAGE TANK.
   - J) PROVIDE MOTORIZED BALL VALVES TO ALLOW THE AUTOMATIC OPERATION OF THE FUEL OIL MANAGEMENT SYSTEM AS DESCRIBED HEREIN:
     - 1) PROVIDE MOTORIZED BALL VALVES, 3" BODY, TO ALLOW THE AUTOMATIC TANK FILL SELECTION OF EITHER OF THE MAIN TANKS. PROVIDE VALVES FOR EACH OF THE TWO TANKS.
     - 2) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW THE MAIN TANK SELECTION FOR THE TANK SUPPLYING THE FUEL OIL TRANSFER PUMP SET. PROVIDE VALVES FOR EACH OF THE TANKS.
     - 3) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW THE MAIN TANK SELECTION FOR RETURNING THE FUEL OIL FROM THE SYSTEM. PROVIDE VALVES FOR EACH OF THE TANKS.
     - 4) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW THE MAIN TANK SELECTION FOR RETURNING RELIEF OIL FROM THE TRANSFER PUMP SET. PROVIDE VALVES FOR EACH OF THE TANKS.
     - 5) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW MAIN TANK SELECTION FOR SUPPLYING FUEL OIL TO THE FUEL FILTRATION PUMP SET. PROVIDE VALVES FOR EACH OF THE TANKS.
     - 6) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW MAIN TANK SELECTION FOR RETURNING TREATED FUEL TO THE MAIN TANK FROM THE FILTRATION PUMP SET.
     - 7) PROVIDE MOTORIZED BALL VALVES, 2" BODY, TO ALLOW MAIN TANK SELECTION FOR RETURNING RELIEF OIL FROM THE FUEL FILTRATION PUMP SET.
     - 8) PROVIDE MOTORIZED BALL VALVE, 2" BODY, TO ALLOW THE DRAINING OF THE FUEL OIL HEADER IN CASE OF FIRE IN THE GENERATOR ROOM.
     - 9) VALVES SHALL HAVE CARBON STEEL, 150 # CLASS, BODY, STAINLESS STEEL BALL AND STEM, PTFE SEATS AND STEM SEAL, AND FLANGED CONNECTIONS. VALVES SHALL BE WATTS 1501 OR APPROVED EQUAL.
     - 10) ELECTRIC ACTUATORS SHALL BE DESIGNED FOR 120 VAC POWER TO OPEN, POWER TO CLOSE OPERATION, AND SHALL HAVE ELECTRICAL INTERLOCK SWITCH AT EACH END OF TRAVEL FOR INTERFACE WITH THE MAIN CONTROL SYSTEM. ACTUATORS SHALL BE WATTS 700 OR APPROVED EQUAL.
   - K) PROVIDE FIRE SAFETY SHUTOFF VALVES WITH FUSIBLE LEVER HANDLES ON THE INLET LINES TO THE FUEL OIL TRANSFER PUMP SET, THE FUEL OIL TREATMENT PUMP SET AND ON THE SUPPLY PIPE BEFORE THE HEADER IN THE GENERATOR ROOM.
   - L) PROVIDE A FUEL OIL VENT PROTECTOR, 2" SIZE, ON THE VENT FOR THE HEADER.
   - M) PROVIDE A 2" VACUUM BREAKER IN THE VENT LINE.
3. MAIN TANK GAUGING AND LEAK MONITORING SYSTEM
   - A) PROVIDE AND INSTALL FOR EACH OF THE TWO (2) FUEL OIL STORAGE TANKS A TANK GAUGING AND LEAK MONITORING SYSTEM THAT CONTINUOUSLY INDICATES THE TANK CONTENTS AND MONITORS THE FOLLOWING: LOW LIQUID LEVEL, TANK LEAK (THREE POINTS PER TANK) AND TANK OVERFILL. SYSTEM SHALL BE EQUAL TO PREFERRED UTILITIES MODEL TG-TL-03-ARF-NY.
   - B) FURNISH FOR EACH TANK A LEVEL TRANSDUCER TO INTERFACE WITH THE TANK GAUGE IN THE FUEL MANAGEMENT PANEL. LEVEL TRANSDUCER SHALL BE INTRINSICALLY SAFE, SHALL PROVIDE 0.25 PERCENT RESOLUTION, AND SHALL BE FLOAT OPERATED. UNIT SHALL BE SEALED AGAINST TANK PRESSURE, ELECTRONICS SHALL BE SUBMERGED IN SILICONE OIL FILL. UNIT SHALL ALLOW MECHANICAL TESTING OF HIGH LEVEL SETTING AND CALIBRATION OF GAUGE FROM TOP OF TANK WITHOUT WITHDRAWAL OF UNIT. ASSEMBLY SHALL BE DESIGNED FOR INSTALLATION IN TANK VAULTS WITH AS LITTLE AS 24 INCHES OF HEAD ROOM ABOVE THE TANK. UNIT SHALL UTILIZE A MOVING FLOAT ON A STAINLESS STEEL EXTENSION WIRE AND SHALL BE EQUAL TO PREFERRED UTILITIES MODEL TG-FL-WF.
   - C) PROVIDE A TOTAL OF ELEVEN (11) LEAK SENSORS FOR MONITORING OF THE MAIN FUEL TANK ROOM FLOOR AROUND THE FOUR (4) SIDES OF THE TANKS, ONE (1) IN THE SUMP PIT AND TWO (2) IN THE SUMP PANS.
     - 1) THE LEAK MONITORS SHALL BE SOLID STATE, INTRINSICALLY SAFE, HAVE CONTINUOUS ELECTRONIC CHECKING, FAIL SAFE TO AN ALARM CONDITION AND HAVE INDICATING TRANSMITTERS WITH TEST SWITCHES TO EXERCISE THE SENSORS AND CHECK THE INSTRUMENT RESPONSE. TEST SYSTEMS THAT BYPASS THE SENSORS OR RELY ONLY ON ELECTRONIC SIMULATION ARE ACCEPTABLE.
     - 2) SENSORS SHALL DIFFERENTIATE BETWEEN OIL OR WATER LEAK AND DISPLAY A WATER OR OIL LED ON THEIR INDICATING TRANSMITTERS WHILE SENDING AN APPROPRIATE ALARM SIGNAL TO THE INSTRUMENT. FOR LEAK SENSING IN TANK VAULT, SUPPLY HARD VINYL PROTECTIVE HOUSING FOR LEAK SENSOR. LEAK SENSORS SHALL BE EQUAL TO PREFERRED INSTRUMENTS MODEL HD-A1.
   - D) THE REMOTE GAUGE INSTRUMENT SHALL BE MICROPROCESSOR BASED, ENCLOSED IN A FLUSH-MOUNTED CAST ALUMINUM HOUSING, PROVIDE A 4-20 MADC VOLUMETRIC OUTPUT, CONTINUOUSLY DISPLAY AN 0.8 INCH DIGITAL READOUT IN GALLONS, A PUSH-BUTTON READOUT IN INCHES OF DEPTH, A PUSH-BUTTON ALARM-SETPOINT RECALL, A PUSH-BUTTON OVERFILL ALARM TEST AND A PUSH-BUTTON ALARM SILENCE. THE GALLONS AND INCHES CORRELATION SHALL CORRESPOND TO THE TANK MANUFACTURER'S STICK CHART. INSTRUMENT ACCURACY SHALL BE MAINTAINED WITH VOLTAGE FLUCTUATIONS FROM 120 VAC -20% TO +15%.
   - E) EACH ALARM CONDITION SHALL SIGNAL THE INSTRUMENT TO SOUND AN INTEGRAL AUDIBLE ALARM, DISPLAY AN ENGLISH LANGUAGE ALARM DESCRIPTION AND CLOSE DEDICATED SETS OF ALARM CONTACTS AND CONTACTS FOR A REMOTE AUDIBLE ALARM. PUSH-BUTTON ALARM ACKNOWLEDGMENT SILENCES THE AUDIBLE ALARMS. ALL VISUAL DISPLAYS REMAIN UNTIL THE ALARM IS CLEARED. THE LEAK ALARM CONTACTS (FOR BUILDING AUTOMATION INTERFACE) WILL REMAIN ACTIVATED UNTIL THE SITUATION IS CORRECTED. THE OVERFILL ALARM CONTACTS AUTOMATICALLY OPEN IN 60 SECONDS TO SILENCE THE FILL TERMINAL OVERFILL ALARM AND SILENCING STATION.
   - F) A REMOTE ALARM STATION SHALL BE PROVIDED FOR MOUNTING NEAR THE OUTDOOR FILL STATION. THIS ALARM STATION SHALL PROVIDE AUDIBLE AND VISUAL INDICATION OF THE FOLLOWING:
     - 1) MAIN TANK HIGH LEVEL, EACH TANK.
     - 2) FILL VALVE OPEN, EACH TANK.
     - 3) SYSTEM FAIL, OR "DO NOT FILL" FLASHING ALARM LIGHT.
   - G) GAUGE INSTALLATION REQUIREMENTS:
     - 1) CONTRACTOR MUST ADHERE STRICTLY TO THE MANUFACTURER'S INSTALLATION PROCEDURES. ONE DAY FACTORY START-UP AND CALIBRATION TO BE INCLUDED FOR TANK GAUGING AND LEAK DETECTION SYSTEM BY GAUGE MANUFACTURER.
     - 2) A LETTER FROM THE TANK GAUGE AND LEAK DETECTION SYSTEMS MANUFACTURER SHALL BE PROVIDED TO THE MECHANICAL ENGINEER STATING THAT THE SYSTEM WAS CHECKED OUT AND CALIBRATED BY A FACTORY TRAINED REPRESENTATIVE AND THAT ALL COMPONENTS ARE IN WORKING ORDER.
     - 3) TANK MANUFACTURER'S CERTIFIED TANK PRINT AND STICK CHART MUST BE PROVIDED TO PROPERLY CALIBRATE AND MANUFACTURE GAUGE. THIS INFORMATION MUST BE PROVIDED TO THE TANK GAUGE AND LEAK DETECTION MANUFACTURER AT THE TIME OF ORDER.
     - 4) INSTALL WHERE SHOWN NEAR THE TANK FILL TERMINAL, A 10 INCH WEATHERPROOF BELL. AN OVERFILL ALARM SIGNAL FROM THE INSTRUMENT SHALL SOUND THE BELL. IF THE FILL OPERATOR DOES NOT MANUALLY SILENCE THE BELL IN ONE MINUTE, IT WILL SILENCE AUTOMATICALLY. THE ALARM STATION SHALL BE EQUAL TO PREFERRED INSTRUMENT J4025.
4. FUEL OIL PUMPING AND STRAINING SET
   - A) PROVIDE AND INSTALL A FACTORY ASSEMBLED "PACKAGED" DUPLEX FUEL OIL PUMP SET. THE SET SHALL BE PIPED AND WIRED, WITH COMPONENTS MOUNTED ON A STEEL BASE SUPPORT FABRICATED OF 1/4" STEEL PLATE WITH 4" STEEL SIDE RAILS CONTINUOUSLY WELDED TO THE BASE. BASE SUPPORT TO BE FABRICATED WITH 2-3/4" OVERFLOW LIP WHICH FORMS A PUMP SET RUPTURE BASIN. IN THE RUPTURE BASIN THROUGH A 3/4" WELDED ON THREADED FEMALE NIPPLE SHALL BE A LEVEL SWITCH FOR LEAK DETECTION, VISUAL AND AUDIBLE ALARM AND ANNUNCIATION FOR THE PUMP SET RUPTURE BASIN SHALL BE LOCATED IN THE PUMP SET CONTROL PANEL. PROVIDE A 1/2" PLUGGED DRAIN CONNECTION IN THE RUPTURE BASIN. ALL WIRING AND PIPING SHALL BE COVERED BY LABELS OF NATIONALLY RECOGNIZED TRADE UNIONS. PIPE SHALL BE SCHEDULE 40 BLACK PIPE WITH SCREWED CONNECTIONS. THE SET SHALL CONSIST OF BUT NOT BE LIMITED TO THE FOLLOWING COMPONENTS:
   - B) TWO (2) FUEL OIL PUMPS, EACH WITH A CAPACITY OF NOT LESS THAN 1800 GPH @ 100 PSIG DISCHARGE PRESSURE WHEN OPERATING WITH NO. 2 DIESEL OIL. PUMPS SHALL BE TRIPLE SCREW TYPE WITH HEAT TREATED STEEL ROTORS, CAST IRON BODY, NEEDLE ROLLER BEARINGS AND MECHANICAL SEALS. PUMPS SHALL BE PREFERRED MODEL LO-402XH-NY.
     - 1) EACH PUMP SHALL BE DIRECTLY COUPLED TO A NOT LESS THAN 5 HP, 3450
     - 2) TWO UNITS SHALL BE CAPABLE OF OPERATING ON 230/460 VOLT, 3 PHASE, 60 HZ ELECTRICAL SERVICE.
     - 3) PROVIDE CONTROLLER TO OPERATE MOTOR DIRECTLY FROM RELAY LOGIC CONTACTS IN THE MAIN FUEL CONTROL CABINET. PROVIDE FULL VOLTAGE STARTER WITH OVERLOAD PROTECTION FOR THE MOTOR, AND OVERCURRENT PROTECTION FOR THE CONDUCTORS.
     - 4) STARTER SHALL INCORPORATE STAGING TIMERS TO APPLY THE FIELD VOLTAGES IN A SEQUENCE THAT WILL PREVENT INRUSH CURRENT OVERLOADING.
     - 5) ALL AC MOTORS FOR THE PUMPING SET AND THE FILTRATION SYSTEM SHALL BE POWERED THROUGH COMBINATION MOTOR STARTERS LOCATED IN A CABINET MOUNTED TO THE PUMP SET. ALL POWER WIRING FROM THIS CABINET TO THE MOTORS ON THE SET SHALL BE FACTORY INSTALLED AND TESTED.
   - C) TWO (2) 3" DUPLEX FUEL OIL STRAINERS FOR THE SUCTION SIDE OF EACH PUMP, SIZED TO PRODUCE LESS THAN 0.5 INCHES MERCURY DROP WITH THE MAXIMUM ANTICIPATED FLOW IN THE SUCTION LINE. STRAINERS SHALL HAVE ONE PIECE CAST-IRON BODY AND SHALL BE SUITABLE FOR PRESSURE TO 200 PSI. STRAINER BASKETS TO BE FABRICATED OF 100 MESH STAINLESS STEEL CLOTH AND TO COME COMPLETE WITH LEVER WRENCH HANDLE. STRAINER SHALL BE EQUAL TO PREFERRED UTILITIES NO. 50.
   - D) TWO (2) FUEL OIL PUMP RELIEF VALVES WITH AN ADJUSTABLE RANGE OF 75 TO 300 PSIG SET AT 100 PSIG. VALVES SHALL BE SIZED TO RELIEVE THE FULL FLOW OF THE PUMP WITHOUT CAUSING THE PUMP MOTOR TO OVERLOAD OR ANY COMPONENT'S PRESSURE RATING TO BE